Foundations of Physics

Vol. 23, No. 1 January 1993

CONTENTS

PART IV. INVITED PAPERS DEDICATED TO LOUIS DE BROGLIE

From Descartes and Newton to Einstein and de Broglie 1
J. P. Vigier

David Joseph Bohm: 1917–1992 5
P. R. Holland and J. P. Vigier

Reality in Neutron Interference Experiments 7
H. Rauch

From Quantum Mechanics to Universal Structures of Conceptualization and Feedback on Quantum Mechanics 37
Mioara Mugur-Schächter

Louis de Broglie's Conception of Physics 123
Georges Lochak

Book Review: *Quantum Paradoxes and Physical Reality* 133
Alastair I. M. Rae

Book Review: *Recent Advances in General Relativity* 137
Horst-Heino von Borzeszkowski

Book Review: *Particles and Waves* 141
Doren A. Recker

Book Review: *Quantum Mechanics, Vols. I and II* 145
André Martin

Book Review: *I concetti della fisica* 149
Mario Bunge

Book Review: *Thought Experiments* 153
William J. McKinney

Book Review: *Operator Methods in Quantum Mechanics* 157
Richard L. Hall

Book Review: *The Interacting Boson–Fermion Model* 161
Joseph Ginocchio

Book Review: *Gases, Liquids and Solids, and Other States of Matter* 165
David L. Goodstein

Announcement: *Symposium on the Foundations of Modern Physics 1993* 169

Foundations of Physics

Vol. 23, No. 2 February 1993

CONTENTS

PART I. INVITED PAPERS DEDICATED TO ASIM ORHAN BARUT

To Asim Orhan Barut on His Sixty-Fifth Birthday 173
Akira Inomata, Raj Wilson, and Alwyn van der Merwe

Generation of a Coherent State of the Micromaser Field 177
Fam Le Kien, M. O. Scully, and H. Walther

Understanding Geometrical Phases in Quantum Mechanics: An Elementary Example 185
J. C. Solem and L. C. Biedenharn

Barut Equation for the Particle–Antiparticle System with a Dirac Oscillator Interaction 197
M. Moshinsky and G. Loyola

The Geometry of State Space 211
M. Adelman, J. V. Corbett, and C. A. Hurst

Eigenvibrations of the Expanding Universe 225
Paolo Budinich and Ryszard Raczka

On Theories of Everything 239
J. G. Taylor

Mechanical Models for Lorentz Group Representations 245
N. Mukunda

Classical Versus Quantum Gravity 261
Wolfgang Drechsler

Compact Quantum Systems and the Pauli Data Problem 277
A. J. Bracken and R. J. B. Fawcett

Bound States of the Nucleon–Monopole System 291
Tetsuo Sawada

A Complex Formulation of Generalized Hamiltonian (Birkoffian) Theory 313
J. McEwan

Conformal Field Theories and Critical Phenomena 329
Bo-wei Xu

Foundations of Physics

Vol. 23, No. 3 March 1993

CONTENTS

PART II. INVITED PAPERS DEDICATED TO ASIM ORHAN BARUT

Parameter Dependence and Outcome Dependence in Dynamical Models for State Vector Reduction 341
G. C. Ghirardi, R. Grassi, J. Butterfield, and G. N. Fleming

Zitterbewegung Modeling 365
David Hestenes

On the Correspondence of Semiclassical and Quantum Phases in Cyclic Evolutions 389
M. G. Benedict and W. Schleich

Unitarity Bounds for 4-Fermion Contact Interactions 399
T. B. Anders, R. von Mellenthin, B. Pfeil, and H. Salecker

Quantum Gravity, the Origin of Time and Time's Arrow 411
J. W. Moffat

A Nonstandard Model 439
W. T. Grandy, Jr.

Does the Electron Have a Structure? 461
R. F. O'Connell

Coincidental Spectral Lines for the Hydrogen Atom 465
Daniel W. Wyss and Walter Wyss

A Generalization of Dirac Nonlinear Electrodynamics, and Spinning Charged Particles 469
Waldyr A. Rodrigues, Jr., Jayme Vaz, Jr., and Erasmo Recami

Review of Invariant Time Formulations of Relativistic Quantum Theories 487
J. R. Fanchi

List of Contents of *Foundations of Physics Letters* 549

Foundations of Physics

Vol. 23, No. 4 April 1993

CONTENTS

PART III. INVITED PAPERS DEDICATED TO ASIM ORHAN BARUT

Classical Foundations of Quantum Groups 551
Christian Fronsdal

Quantum Deformations of Singletons and of Free Zero-Mass Fields 571
M. Flato, L. K. Hadjiivanov, and I. T. Todorov

From Where Do Quantum Groups Come? 587
Moshé Flato, Zhi-Cheng Lu, and Daniel Sternheimer

Global Properties of Conformally Flat Momentum Space and Their Implications 599
P. Budinich and R. Raczka

The Self-Adjointness of Hermitian Hamiltonians 617
Chengjun Zhu and John R. Klauder

Group Theory and Solutions of Classical Field Theories with Polynomial Nonlinearities 633
A. M. Grundland, J. A. Tuszýnski, and P. Winternitz

New Gauge Field Models with Non-Yang–Mills Dynamics 667
D. H. Tchrakian

Algebraic Methods for the Natanzon Potentials 675
Patricio Cordero and Sebastián Salamó

Radial Excitation of Hadronic States with Null Pontryagin Index 691
Syurei Iwao

Foundations of Physics

Vol. 23, No. 5 May 1993

CONTENTS

PART IV. INVITED PAPERS DEDICATED TO ASIM ORHAN BARUT

Aharonov–Bohm Effect in the Presence of Superconductors 703
L. O'Raifeartaigh, N. Straumann, and A. Wipf

The Pole Expansion in Normalized QED 711
M. Berrondo and J. F. Van Huele

A Global Equilibrium as the Foundation of Quantum Randomness 721
Detlef Dürr, Sheldon Goldstein, and Nino Zanghí

Surfaces and Lines in Terms of the Delta and Step Functions 739
Yasushi Takahashi

Relativistic and Nonrelativistic Dynamical Groups 751
A. Bohm

Group Theory and Orbital Fluctuations of the Hydrogen Atom 769
H. Kleinert

Casimir Force Between Two Aharonov–Bohm Solenoids 809
I. H. Duru

A Search for the Classical Model of Spin 819
M. Božić and Z. Marić

Two-Body Dirac Equation Versus KDP Equation 837
Z. Z. Aydin and A. U. Yilmazer

Self-Energy Quantum Electrodynamics: Multipole Radiation 841
Yousef I. Salamin

Classification of Exactly Solvable Potential Problems 851
Haluk Beker

Foundations of Physics

Vol. 23, No. 6 June 1993

CONTENTS

Back-Action in the Measurement of "Macroscopic Quantum Superpositions" in Microwave Cavities 857
T. Zaugg, M. Wilkens, and P. Meystre

Algebraic Description of the Quantum Defect 873
R. Gilmore, H. G. Solari, and S. K. Kim

The Collapse of Quantum States: A New Interpretation 881
Shimon Malin

Spontaneous Emission in Cavities: How Much More Classical Can You Get? 895
Jonathan P. Dowling

Bremsstrahlung in Self-Field QED 907
Yousef I. Salamin

Time in a Quantum Universe 913
Peter D. B. Collins and Euan J. Squires

The Unreasonable Effectiveness of Computer Physics 923
Joseph Dreitlein

The Most Energetic Processes in the Universe 931
Wolfgang Kundt

Conformal Compactification from Spinor Geometry 949
P. Budinich

Boundary Conditions in Quantum Field Theories 965
Philip B. Burt

Abstract: Topological Change Quantization via Path Integration: An Application of the Kustaanheimo–Stiefel Transformation 969
Akira Inomata, Georg Junker, and Raj Wilson

Foundations of Physics

Vol. 23, No. 7 July 1993

CONTENTS

What Makes a Theory Physically "Complete"? 971
Andrew Elby, Harvey R. Brown, and Sara Foster

Quantum Mechanical Interaction-Free Measurements 987
Avshalom C. Elitzur and Lev Vaidman

Sum Logics and Tensor Products 999
Robin L. Hudson and Sylvia Pulmannová

Energy Levels of the Hydrogen Atom due to a Generalized Dirac Equation 1025
Ulrich Bleyer

Book Review: *Heisenberg's Uncertainties and the Probabilistic Interpretation of Wave Mechanics* 1049
Franco Selleri

Book Review: *The Quantum Theory of Measurement* 1053
GianCarlo Ghirardi

Book Review: *Theory Construction and Selection in Modern Physics: The S Matrix* 1057
Edward M. MacKinnon

Book Review: *The Dirac Equation* 1061
F. Gesztesy

Book Review: *Chaos, Dynamics and Fractals: An Algorithmic Approach to Deterministic Chaos* 1065
Robert L. Devaney

Book Review: *Clifford Algebra and Spinor-Valued Functions* 1067
Geoffrey Dixon

List of Contents for *Foundations of Physics Letters* 1071

Foundations of Physics

Vol. 23, No. 8 August 1993

CONTENTS

Topological Charge Quantization via Path Integration: An Application of the Kustaanheimo–Stiefel Transformation 1073
Akira Inomata, Georg Junker, and Raj Wilson

Unphysical and Physical(?) Solutions of the Lorentz–Dirac Equation 1093
Stephen Parrott

Remarks on the Physical Meaning of the Lorentz–Dirac Equation 1121
E. Comay

Book Review: *The Philosopy of Quantum Mechanics: An Interactive Interpretation* 1137
Meir Hemmo

Book Review: *Uncertainty: The Life and Science of Werner Heisenberg* 1147
Stanley Goldberg

Book Review: *Innovation in Maxwell's Electromagnetic Theory* 1157
Robert March

Book Review: *Postprincipia: Gravitation for Physicists and Astronomers* 1161
Heinrich H. Eichhorn

Book Review: *Group-Theoretical Methods for Integration of Nonlinear Dynamical Systems* 1165
Alexander Sevrin

Book Review: *TEX by Example: A Beginner's Guide* 1169
Joshua N. Goldberg

Announcement: Frontiers of Fundamental Physics Conference 1173

List of Contents: *Foundations of Physics Letters*, Vol. 6, No. 3 1174

Foundations of Physics

Vol. 23, No. 9 September 1993

CONTENTS

PART I. INVITED PAPERS DEDICATED TO DAVID HESTENES

Imaginary Numbers Are Not Real—The Geometric Algebra of Spacetime 1175
Stephen Gull, Anthony Lasenby, and Chris Doran

Clifford Algebras and Hestenes Spinors 1203
Pertti Lounesto

States and Operators in the Spacetime Algebra 1239
Chris Doran, Anthony Lasenby, and Stephen Gull

Classical Limit of Real Dirac Theory: Quantization of Relativistic Central Field Orbits 1265
Heinz Krüger

List of Contents: *Foundations of Physics Letters*, Vol. 6, No. 3 1289

Foundations of Physics

Vol. 23, No. 10 October 1993

CONTENTS

PART II. INVITED PAPERS DEDICATED TO DAVID HESTENES

David Hestenes: The Early Years 1291
Garret Sobczyk

A Multivector Derivative Approach to Lagrangian Field Theory 1295
Anthony Lasenby, Chris Doran, and Stephen Gull

Electron Paths, Tunnelling, and Diffraction in the Spacetime Algebra 1329
Stephen Gull, Anthony Lasenby, and Chris Doran

Distance Geometry and Geometric Algebra 1357
Andreas W. M. Dress and Timothy F. Havel

Linear Transformations in Unitary Geometric Algebra 1375
Garret Sobczyk

On the Relativistic Calculation of Spontaneous Emission 1387
Roger Boudet

Foundations of Physics

Vol. 23, No. 11 November 1993

CONTENTS

PART III. INVITED PAPERS DEDICATED TO DAVID HESTENES

A Hilbert Space for the Classical Electromagnetic Field 1405
Bernard Jancewicz

On Poisson Brackets and Symplectic Structures for the Classical and Quantum Zitterbewegung 1423
A. O. Barut and N. Ünal

Linear and Nonlinear Dirac Equation 1431
C. Daviau

The Equations of Dirac and the $M_2(\mathbb{H})$-Representation of $Cl_{1,3}$ 1445
P. G. Vroegindeweij

The Clifford Bundle and the Nature of the Gravitational Field 1465
Waldyr A. Rodrigues, Jr. and Quintino A. G. de Souza

$SO(m)$-Invariant Differential Operators on Clifford Algebra-Valued Functions 1491
F. Sommen and N. Van Acker

Vector-Valued Rational Forms 1521
D. E. Roberts

An Analysis of Fierz Identities, Factorization and Inversion Theorems 1535
Suemi Rodríguez-Romo

On Invertibility in High-Dimensional Clifford Algebras 1543
Pavel Semenov

List of Contents: *Foundations of Physics Letters*, Vol. 6, No. 3 1547

Foundations of Physics

Vol. 23, No. 12 December 1993

CONTENTS

Hans-Jürgen Treder at 65 1549
Wilfried Schröder

Decoherence, Relative States, and Evolutionary Adaptation 1553
Simon Saunders

The Extended Classical Charged Particle. II 1587
R. G. Beil

The Consistency of Consistent Histories: A Reply to d'Espagnat 1601
Robert B. Griffiths

Book Review: *Cosmos, Bios, Theos* 1611
Don Page

Book Review: *Quantum Mechanics: An Empiricist View* 1613
Richard Healey

Book Review: *Introduction to Special Relativity, 2nd edition* 1617
Richard Matzner

Book Review: *Niels Bohr's Times, in Physics, Philosophy, and Polity* 1621
Henry J. Folse

Book Review: *Calabi–Yau Manifold—A Bestiary for Physicists* 1625
B. Greene

Book Review: *Recombination in Semiconductors* 1631
Eckehard Schöll

Book Review: *Scattering Theory* 1633
J. W. Darewych

List of Contents: *Foundations of Physics Letters*, Vol. 6, No. 4 1635

Author Index to Volume 23 1637

Subject Index to Volume 23 1639